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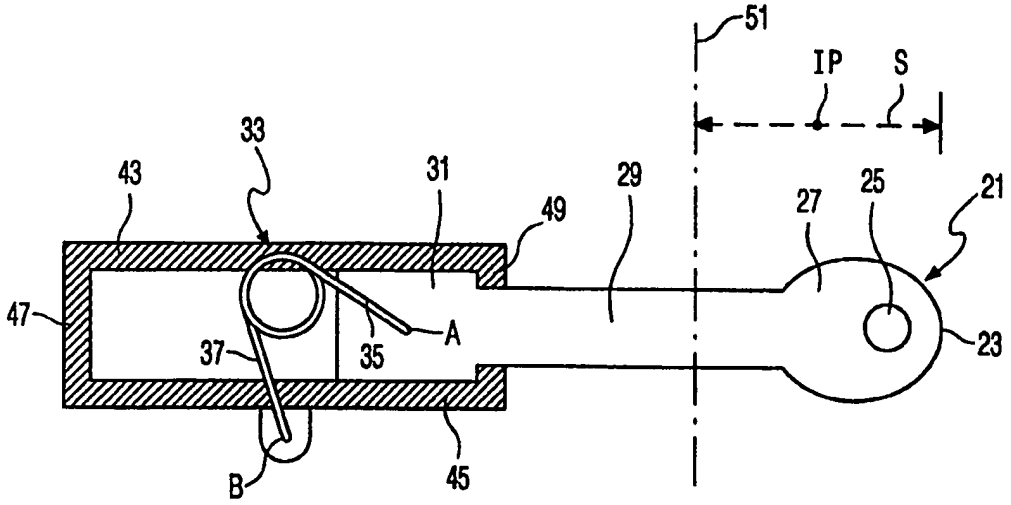

(57) Abstract

A portable telephone unit is proposed comprising a telephone housing and a microphone unit movable between a retracted rest position and an operating position protruding from the telephone housing movable in a path of movement over a distance of travel. In the portable telephone unit, a bistable mechanism cooperating with a microphone unit has spring means for pushing the microphone unit with spring force to the operating position, a component of the spring force exerted by the spring means changing direction after an intermediate unstable point has been passed, when the microphone unit is moved between the rest position and the operating position.

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PORTABLE TELEPHONE WITH MOVABLE MICROPHONE UNIT

The invention relates to a portable telephone unit as defined in the preamble of claim 1.

Portable telephone units of this type are known from practice. With this type of telephones, the microphone is accommodated in a movable microphone unit having the object of limiting as much as possible the outside dimensions of the telephone at moments the telephone is not used. For using the telephone, the user activates the microphone unit by hand, so that it moves to outside the telephone housing. With portable telephone units known from practice, for example, a so-called "push-push" mechanism is used. For moving the microphone unit out, a hand pushes on the free end of the microphone unit, so that the microphone unit is pressed inward into the telephone housing over a slight distance of travel after which, when the pressure is eliminated, the microphone unit is pushed outward due to the spring force by the spring means present for this purpose in the telephone housing. For moving the microphone unit inward again, the free end is pushed again and the microphone unit is pressed inward up to a position slightly past the rest position. When the pressure is eliminated then, the microphone unit moves back over a slight distance of travel up to the rest position and is locked there by locking means present for this purpose and is then ready to move outward again in the same fashion.

A disadvantage of portable telephone units of this known type and also of similar portable telephone units is that the mechanism for moving the microphone unit outward and for locking it in the rest position is rather complicated.

It is an object of the invention to provide a portable telephone unit of the type defined in the opening paragraph having a simple mechanism and being suitable, in addition, for offering further advantages as will appear hereinafter. To this end, the telephone unit according to the invention has the characterizing features as claimed in the characterizing part of claim 1.

It has appeared that a mechanism of this type may be very simple and may be arranged in various manners.

A disadvantage not yet mentioned of the telephone unit known from practice and discussed above is that the user needs two hands to shift the microphone unit, one for holding the telephone housing and the other for exerting the pressure on the microphone unit. A preferred embodiment of the invention which offers advantages in this respect is claimed in claim 2. The fact that, when the microphone unit moves inward from the operating position to the rest position, the unstable point of the bistable mechanism is passed the moment when the free end of the microphone unit is still outside the telephone housing makes it possible to move the microphone unit back in again single-handedly. To this end a user only needs to put the free end of the microphone unit against an object, for example, a tabletop and exert a slight pressure with the hand holding the telephone unit. The telephone unit is then initially pushed into the telephone housing by hand and is thereafter automatically retracted further inward up to the rest position after the unstable point has been passed.

In this respect a further embodiment of the invention, as claimed in claim 3, is interesting. A telephone unit arranged according to the latter two embodiments thus does not need to have any external operating means and may be operated single-handedly, both when the microphone unit is moved outward and moved inward.

A possible embodiment of the invention which may have a simple structure is claimed in claim 4.

An interesting embodiment of the invention is claimed in claim 5. No mechanical means are necessary in this embodiment and the necessary spring force is exclusively obtained by the repulsive and/or attracting action of the mutually cooperating magnetic means.

Interesting in this respect is a further version of the latter embodiment, as claimed in claim 6. By applying magnets arranged in pairs, an assembly may be obtained in which the magnetic forces exerted in transverse direction on the microphone unit substantially cancel each other out, so that only slight sideways forces occur which is favorable for a reduction of the friction during the movements of the microphone unit.

An interesting embodiment in which pairs of magnets are used is claimed in claim 7.

In this embodiment there may be manually operable operating means, if desired, for moving the microphone unit outward.

A next embodiment comprising such operating means is claimed in claim 8.

This embodiment is advantageous in that the distance of travel of the operating means may be smaller than the distance of travel of the microphone unit. This enhances the ease of operation and avoids an operating element having to cover a large distance over the outside of the telephone housing.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

In the drawings:

Fig. 1 shows a perspective view of a portable telephone unit according to the invention in which the microphone unit is inside the telephone housing,

Fig. 2 shows a similar view to the one in Fig. 1 in which the microphone unit is moved outward,

Fig. 3 gives a diagrammatic plan view of a bistable mechanism for moving a microphone unit between the operating position and the rest position in which the microphone unit is in the rest position,

Fig. 4 shows a plan view similar to that of Fig. 3 with the microphone unit in the operating position,

Figs. 5 to 8 show plan views similar to those of Figs. 3 and 4 with a bistable mechanism comprising pairs of magnets and in which the microphone unit is in different positions, and

Fig. 9 shows a perspective exploded view of the bottom of a microphone unit and a number of elements cooperating with the unit and belonging to a portable telephone unit according to the invention.

The Figs. 1 and 2 show a portable telephone unit 1 with a telephone housing 3. The telephone housing customarily has at the front a part 5 having a number of openings 7 behind which there is an earphone for the reproduction of sound. The telephone has an antenna 9 for radio communication. At the front of the telephone housing there are further an LCD display 11 and a plurality of operating keys 13. They are all elements known per se of a portable telephone which elements will not be further discussed here. Fig. 2 shows a microphone unit 15 moved to the operating position and protruding from the telephone housing 3 which microphone unit at the free end 17 has an opening 19 behind which a microphone (not shown) is installed. The dimensions of the telephone are such that when the part 5 is held against the ear, the opening 19 may be moved near the mouth for

capturing the sound produced by a user when talking. The shape of the telephone and of the microphone unit may differ from those which are shown in Figs. 1 and 2 and are, in essence, not of great importance to the invention.

A possible bistable mechanism for moving a microphone unit between the rest position and the operating position will be further explained diagrammatically with reference to the Figs. 3 and 4. The Figures show a microphone unit 21 with a free end 23 and an opening 25 behind which a microphone may be installed. The microphone unit 21 comprises a bottom end 27 which may be moved as a whole to outside a telephone housing, a connecting stem-like part 29 and a connecting top end 31. A mechanism further includes a return spring 33. Such springs are generally known in engineering so that a brief description will suffice here. The spring has two legs 35 and 37 and one or more round windings 39. The ends A and B of the respective legs 35 and 37 are bent through 90° in a direction perpendicular to the plane of the drawing and are accommodated in corresponding openings in the top end 31 of the microphone unit 21 and in a stationary part 41 respectively, that forms part of the telephone housing.

The microphone unit 21 is accommodated in a guide 43 inside the telephone housing. The side walls 45 of the guide 43 provide the side guides of the microphone unit, whereas the end walls 47 and 49 form the stops which determine the end positions of the microphone unit, so the rest position and the operating position.

The spring 33 is accommodated with the ends A and B in aforesaid corresponding openings under a certain pretension. In the position shown in Fig. 3, the microphone unit 21 is subjected by the spring 33 to a force of which a component is directed at the end wall 47. The microphone unit 21 is thus kept stable in the position shown. When the microphone unit is moved from the rest position shown in Fig. 3 to the operating position shown in Fig. 4, the point A in the drawing moves from left to right while, initially, the distance of travel between the two end points A and B diminishes, so that the force between these points increases but at the same time the direction of the force from B to A turns to the right until the moment at which the point A has reached the position right over point B and a force component no longer works in the direction of the end wall 47. At that moment there is no force working in the direction of the end wall 49 either and the microphone unit is in an unstable balance. When the microphone unit is moved further to the right, the point A will also move to the right, so that a force component evolves that works in a direction to the right. The microphone unit 21 will thus be pushed to the right while it moves further to the position shown in Fig. 4, so that the point A moves to the right when the spring 33 is at the

same time partly released. The distance of travel S covered by the end point 23 of the microphone unit is shown in Figs. 3 and 4. The unstable point IP is found about halfway the distance of travel S.

It will be obvious that with the mechanism of Figs. 3 and 4 the return spring 33 exerts a force in transverse direction - in the Figs. 3 and 4 upwards - on the microphone unit, which transverse force will cause rather much friction between the microphone unit 21 and the guide 43. The mechanism, however, may be easily modified by applying roller bearings and/or by applying two springs 33 which are symmetrically arranged relative to the microphone unit 21, so that the exerted transverse forces cancel each other out. Alternatively, it is possible to use mechanical spring means of a different shape in lieu of one or more return springs. For example, helically wound pressure springs may be used, having a guide, as desired, to avoid lateral deflection. Also spring means combined with cams, rollers etc. may be applied with which the spring force exerted by the spring means works exclusively in transverse direction, but exerts a spring force having a component in the longitudinal direction of the microphone unit due to the rollers, cams etc.

The boundary of the telephone housing is diagrammatically shown in Fig. 4 by a dash-and-dot line which is referenced 51. When moved from the operating position, see Fig. 4, to the rest position of Fig. 3, the unstable point IP is passed by the free end 23 at a moment when this free end is still outside the telephone housing 51. It is possible to move the microphone unit inward by pressing the free end 23 against a fixed object, for example, a tabletop after which the microphone unit automatically moves further inward once the free end 23 has passed the point IP.

The embodiment shown in Figs. 3 and 4 may be used for a telephone unit comprising operating means for moving the microphone unit 21 outward. These operating means may act, for example, on the microphone unit 21 itself or on the spring 33 and protrude from the telephone housing so that, for example, the thumb of the hand holding the telephone unit may exert a pressure on the microphone unit for moving it outward. However, the embodiment shown is also suitable for use in an embodiment of a portable telephone unit that is free from external operating means which cooperate with the microphone unit 21 and are operable by hand for moving the microphone unit from the rest position to the operating position. For the mass of the microphone unit 21 and the spring force of the spring means 33 may be tuned to each other, so that the microphone unit may be moved by inertia force from the rest position of Fig. 3 to the operating position of Fig. 4 with a movement of the hand of a user. In essence, the microphone unit only needs to be moved outside then over a part of

the distance of travel S, that is, as far as past the unstable point IP.

For simplicity, like reference numerals are used in Figs. 5 to 8 for a number of parts which are similar to those shown in Figs. 3 and 4. The Figs. 5 to 8 show a portable telephone unit 51 in which the spring means of the microphone unit 21 comprise rigidly attached magnetic means 53a,b as well as stationary magnets 55a,b and 57a,b cooperating with the magnetic means 53a,b and connected to the guide 45.

The moving magnets 53a, 53b are installed on the top end 31 of the microphone unit 21 which in this case has recesses 59 on either one of the two sides. All the magnets shown have a block shape in which the direction of magnetization is perpendicular to the main faces of the block. The magnets belonging to a like pair 53a,b; 55a,b and 57a,b are located on either one of the two sides of the microphone unit 21 so that always like poles of the magnet pairs are directed to each other.

The first pair of stationary magnets 57a,b is near the operating position directed to the end wall 49 of the guide 43. This pair of stationary magnets exerts an attracting force on the moving magnets 55a,b which is symbolized in the drawing in that the moving magnets 53a,b are shown in black and the first stationary magnets 57a,b are shown in white. The second pair of stationary magnets 55a,b is nearer the end wall 47 directed to the rest position and is located at a position found between the position of the first pair of stationary magnets 57a,b and the position of the moving pair of magnets 53a,b when the microphone unit 21 is in the rest position, see Fig. 5. The second pair of stationary magnets 55a,b exerts a repulsive force on the moving pair of magnets 53a,b which is symbolized in the drawing in that also the magnets 55a, 55b are shown in black.

The operation of the bistable mechanism of the Figs. 5 to 8 will now be explained. In the position of Fig. 5, the position of rest, the microphone unit 21 is pushed to the left by the repulsive force exerted on the moving magnets 53a,b by the magnets 55a,b, thus against the end wall 47 of the guide 43. The first stationary magnets 57a, 57b meanwhile exert an attracting force on the moving magnets 53a, 53b. These stationary magnets, however, are so remote from the moving magnets that the attracting force thereof is considerably smaller than the repulsive force of the second stationary magnets 55a, 55b.

In Fig. 6 the microphone unit 21 is moved to the right up to the unstable point. The moving magnets 53a, 53b are now practically in front of the second stationary magnets 55a, 55b in a position where there is an unstable balance of forces, where the forces to the left and to the right on the microphone unit 21 keep each other balanced. Directly after the unstable point has been passed, see Fig. 7, the second stationary magnets 55a, 55b will

exert a repulsive force to the right on the moving magnets 53a, 53b, which repulsive force diminishes in magnitude with the movement to the right due to the increasing distance of travel. When moved to the right, however, the attracting force of the first pair of stationary magnets 57a, 57b increases. Under the influence of these magnetic forces, the microphone unit 21 will be pushed further to the right up to the operating position shown in Fig. 8 in which the microphone unit 21 protrudes from the boundary 51 of the telephone housing. The position shown in Fig. 8 is the operating position in which the top end 31 of the microphone unit rests against the end wall 49 of the guide 43. This is a stable position, so that the microphone unit 21 remains in the operating position of Fig. 8 as long as no external forces are exerted on this microphone unit 21. If the microphone unit 21 is moved to the left again, for example, by pushing the free end 23 against the fixed object such as a tabletop, the microphone unit will autonomously move back to the rest position shown in Fig. 5 under the influence of the magnetic forces acting on it, as soon as the unstable point IP situated outside the boundary 51 of the telephone housing has been passed.

Finally, a further embodiment of the invention will be discussed with reference to Fig. 9, which embodiment may be considered a modification of the embodiment shown in Figs. 5 to 8 and also works with magnets. In Fig. 9 the microphone unit 61 is seen on the backside so the microphone is thus on the underside. In this embodiment there are manually operable operating means 63 present for moving the microphone unit 61 from the rest position over at least part of its distance of travel. The operating means comprise an operating element which roughly has the form of a bow 65. The bow 65 has an operating button 67 at the top projecting to beyond the telephone housing. Thus a user of the telephone has access to the operating button on the outside of the telephone. Furthermore, the bow 65 has a part 69 movable inside the telephone housing and having sideways protruding guide flanges 71 and two spring legs 73. The operating element 63 as a whole is made of a suitable elastic material, so that the spring legs 73 form a whole with the remaining part of the operating element. These springs form the spring-loaded push-back means which form a spring load on the operating means in a direction to the end position.

Both the microphone unit 61 and the operating means 63 are slidably and movably accommodated in a frame unit 75 made of plastic which is found in the interior of the telephone housing. The details of this frame are for the greater part not of any interest to the invention. Several details will only be discussed in so far as they are of interest for comprehending the invention.

The microphone unit 61 comprises a plurality of sideways protruding

guide members 77 with which the microphone unit can slide over frame ribs and underneath guide members 81. Suitable stops are present to limit the distance of travel of the microphone unit to its desired distance of travel. When moved from the rest position to the operating position, the microphone unit 61 moves in the direction of the arrow 83. The microphone unit 61 has two magnets 85a and 85b on the sides.

The operating unit 63 is slid with the guide flanges 71 underneath the guide members 87 which are present on the frame 75. On the underside of the bow 69 there are two magnets 89a and 89b. These two magnets are moved along the outside of the walls 91 present on the frame. The operating button 67 is accommodated in a slot provided in the telephone housing, so that the operating button 67 rests against an end of this slot when the bow is in its end position, while a precompression is exerted by the spring legs 73 which push against the walls 93 of the frame 75.

The frame 75 has two stationary magnets 95a, 95b on the side opposite to the operating means 63. The direction of magnetization of the magnets 85a,b, 89a,b and 95a,b is equal to that of the magnets 53a,b, 55a,b and 57a,b respectively, in the Figs. 5 to 8. The operation of the bistable mechanism of Fig. 9 is, in essence, equal to that of the bistable mechanism of the Figs. 5 to 8 with the fundamental difference, however, that the magnets 89a, 89b present in the operating means 63 are movable along with the distance of travel of the microphone unit 61, whereas the corresponding magnets 55a, 55b in the Figs. 5 to 8 are stationary. The magnets 89a, 89b can move from said end position to an operating position which is more situated in the direction of the end wall 93 of the frame 75.

By moving the operating button in the direction 97 by hand when the telephone is used, the magnets 98a,b will also move in the direction 97. After the extensive discussion of the bistable mechanism of the Figs. 5-8 it will now be clear that the bistable point of the mechanism is passed at the moment when the magnets 89a,b have moved so far in the direction 97 that these magnets 89a,b pass the magnets 85a,b on the microphone unit. After passing this point, the microphone unit moves in the direction 83 to the stable operating position, even though the operating button 67 is now released by the user so that this button moves back to the end position again under the influence of the spring legs 73.

The spring motion of the spring legs 73 is sufficiently large to cause the operating means 63 to be kept substantially immobile when the microphone unit is moved back from the operating position to the rest position, despite the fact that the magnets 85a,b of the microphone unit pass the magnets 89a,b of the operating means.

Although the invention has been discussed with reference to a limited

number of embodiments, it is by no means restricted thereto. In contrast thereto, the invention extends to any embodiment within the scope of the description of the invention as stated in the independent claim 1, and the present invention is thus not limited to the examples provided.

List of reference numerals

S = stroke
IP = unstable point
1 = telephone
3 = telephone housing
5 = part including earphone
7 = openings
9. = antenna
11 = LCD display
13 = keys
15 = microphone unit
17 = end
19 = opening
21 = microphone unit
23 = free end
25 = opening
27 = bottom end
29 = stem part
31 = top end
33 = return spring
35/37 = leg
39 = winding
41 = stationary part
43 = guide
45 = side walls
47/49 = end walls
51 = boundary of outside of telephone housing
53a,b = moving magnets
55a,b = stationary magnets
57a,b = stationary magnets
59 = recess
61 = microphone unit
63 = operating means

65 = operating element (bow)
67 = operating key
69 = part movable inside the housing
71 = guide flange
73 = spring leg
75 = frame
77 = guide members
79 = rib
81 = guide members
83 = arrow
85a,b = magnets
87 = guide members
89a,b = magnets
91 = wall
93 = end wall
95a,b = magnets
97 = arrow

CLAIMS:

1. A portable telephone unit (1;51) comprising:

- a telephone housing (3),

- a microphone unit (15;21) movable between a retracted rest position inside the telephone housing (3) and an operating position protruding from the telephone housing movable in a path of movement over a distance of travel, the microphone unit (15; 21) comprising a microphone near the free end (17; 25) of the microphone unit capable of protruding from the telephone housing

- and a mechanism cooperating with the microphone unit (15; 21), the mechanism having spring means (33) suitable for pushing the microphone unit with spring force to the operating position, characterized in that

- said mechanism comprises a bistable mechanism and

- in that, when the microphone unit (15; 21) is moved between the rest position and the operating position, the component of the spring force exerted by the spring means (33), which component works along the path of movement of the microphone unit, changes direction after an intermediate unstable point (IP) has been passed.

2. A portable telephone unit (1; 51) as claimed in claim 1, characterized in that

- when the microphone unit (21) is moved from the operating position to the rest position, said unstable point (IP) is passed at the moment when the free end (23) of the microphone unit (21) is still outside the telephone housing (3; 51).

3. A portable telephone unit (1; 51) as claimed in claim 1 or 2, characterized in that

- the telephone housing (3; 51) is free from external operating means cooperating with a microphone unit (15; 21) and operable by hand for shifting the microphone unit from the rest position to the operating position and

- in that the mass of the microphone unit (15; 21) and the spring force of the spring means (33) are tuned to each other so that the microphone unit is movable by inertia force from the rest position to the operating position by a movement of the hand of a user.

4. A portable telephone unit (1; 51) as claimed in one of the claims 1-3,

characterized in that the spring means comprise at least a return spring (33) which engages at one end (B) with the telephone housing (51) and at the other end (A) with the movable microphone unit (21).

5. A portable telephone unit (1; 51) as claimed in one of the claims 1-3, characterized in that the spring means comprise moving magnetic means (53a,b) rigidly attached to the microphone unit (21) and further magnets (55a,b-57a,b) cooperating with the moving magnetic means and with further parts of the telephone unit (51).

6. A portable telephone unit as claimed in claim 5, characterized in that
- at least a pair of moving magnets (53a,b) is present on the microphone unit (21), the magnets (53a,b) belonging to a like pair being located on either one of the two sides of the microphone unit (21) and directed to each other with like poles, and
- in that the further magnets (55a,b-57a,b) comprise at least a pair of stationary magnets, the magnets belonging to a like pair being positioned on either one of the two sides of the path of movement of the microphone unit (21) and also being directed to each other with like poles.

7. A portable telephone unit as claimed in claim 6, characterized in that,
- two pairs of stationary magnets (55a,b-57a,b) are present,
- in that a first pair of stationary magnets (57a,b) is located near the end of the path of movement (49) directed to the operating position,
- in that the first pair of stationary magnets (57a,b) exerts an attracting force on the moving pair of magnets (55a,b),
- in that a second pair of stationary magnets (55a,b) is located nearer the end of the path of movement (47) directed to the rest position at a position lying between the position of the first pair of stationary magnets (57a,b) and the position of the moving pair of magnets (55a,b) when the microphone unit (21) is in the rest position, and
- in that the second pair of stationary magnets (55a,b) exerts a repulsive force on the moving pair of magnets (53a,b).

8. A portable telephone unit as claimed in claim 6, characterized in that
- manually operable operating means (63) cooperating with the microphone unit (61) are present for moving the microphone unit (61) from the rest position over at least part of its distance of travel,
- in that the operating means (63) comprise a movable part (67) extending to outside the telephone housing and a movable part (69) moving inside the telephone housing of a movable operating element (65) which is capable of moving between an operating position and an end

position independently of the microphone element (61),

- in that the operating means (63) comprise spring-mounted push-back means (73) exerting a spring force on the operating means (63) in a direction to the end position,

- in that only a single pair of moving magnets (85a,b) is present on the microphone unit (61) which form a first pair of moving magnets,

- in that the further magnets comprise a second pair of moving magnets (89a,b) fixedly connected to the part (69) of the operating element (63) moving inside the telephone housing, the magnets (89a,b) belonging to the second pair of moving magnets being located substantially on either one of the two sides of the microphone unit (61) and being directed to each other with like poles,

- in that only a single pair of stationary magnets (85a,b) is located near the end of the path of movement directed to the operating position,

- in that the pair of stationary magnets (95a,b) exerts an attracting force on both the first and the second pair of moving magnets (85a,b; 89a,b),

- in that the second pair of moving magnets (89a,b) in the rest position of the microphone unit (61) and in the end position of the operating element (63) is located at a position between the position of the first pair of stationary magnets (95a,b) and the position of the first pair of moving magnets (85a,b),

- in that in the operating position the second moving magnets (89a,b) are located at a position that is further away from the stationary magnets (95a,b) and

- in that in the rest position of the microphone unit (61), said unstable point of the bistable mechanism is passed when the operating element (85) is moved from the end position to the operating position.

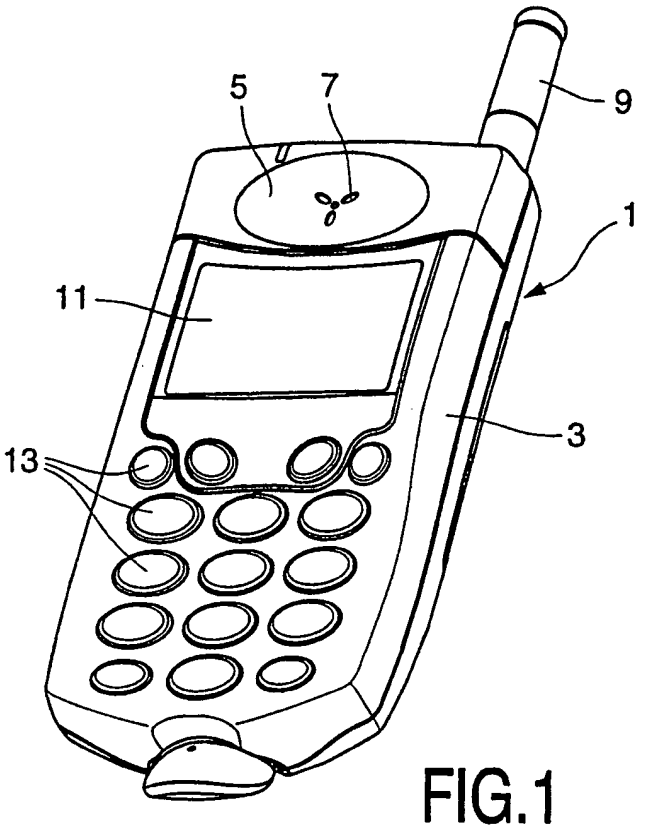

FIG.1

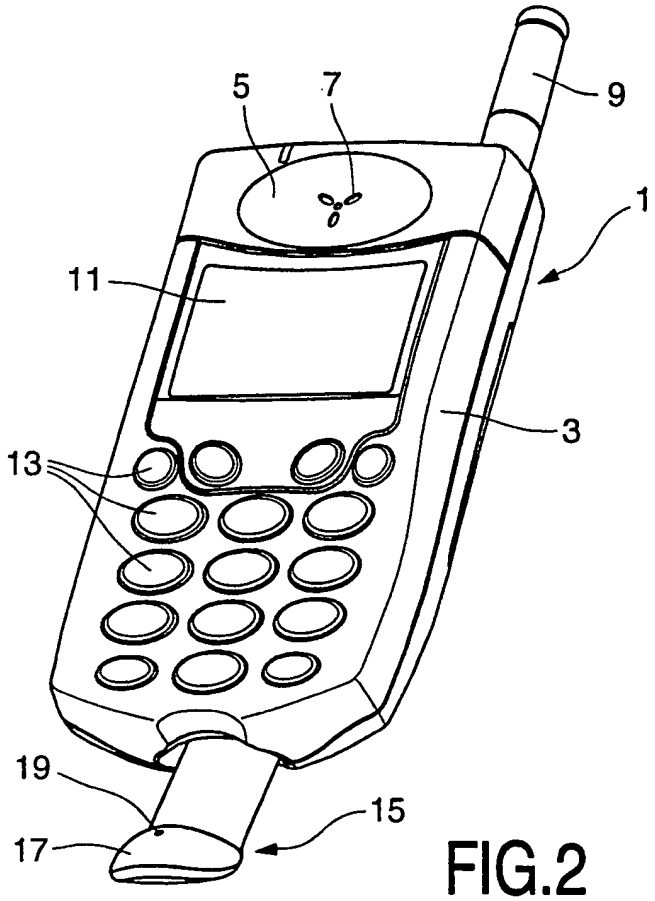

FIG.2

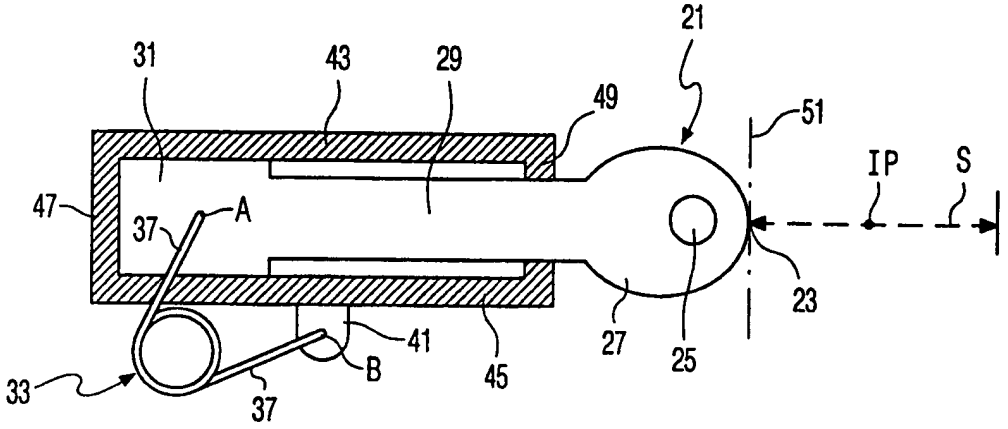
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FIG. 3

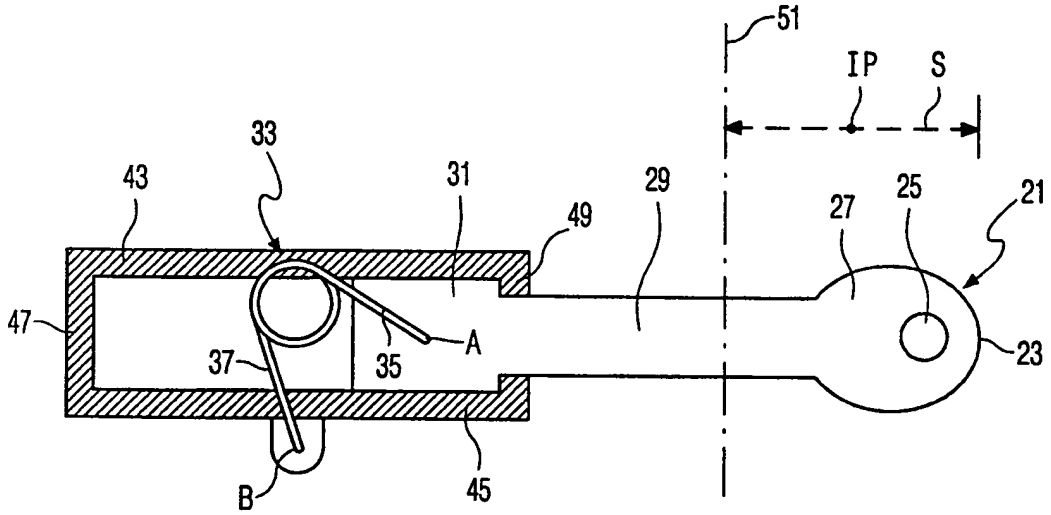
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FIG. 4

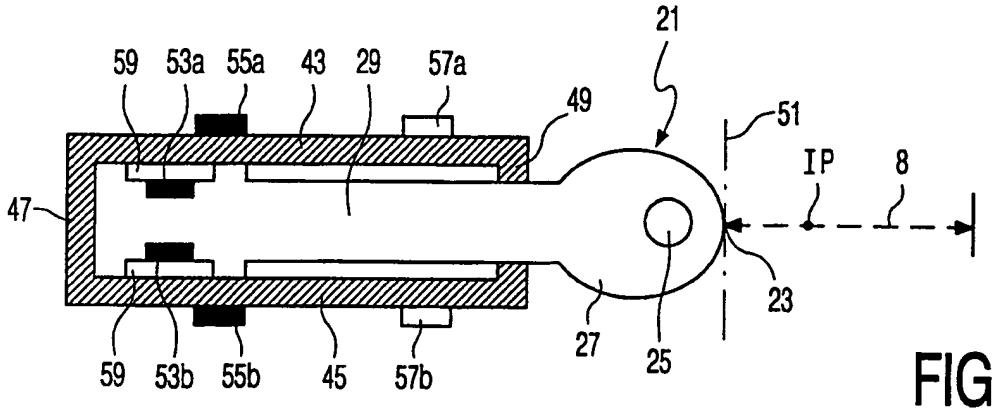


FIG. 5

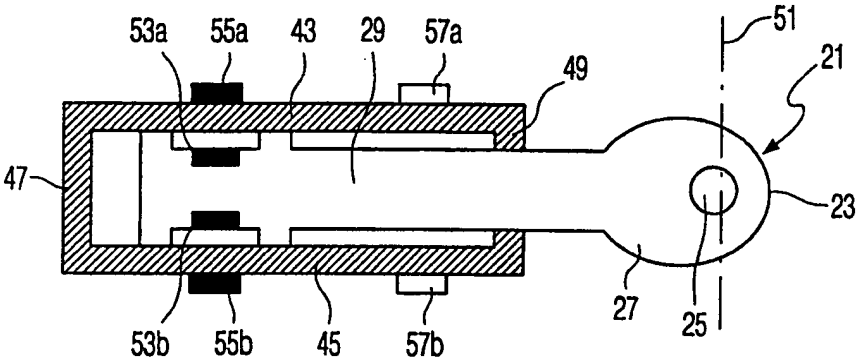


FIG. 6

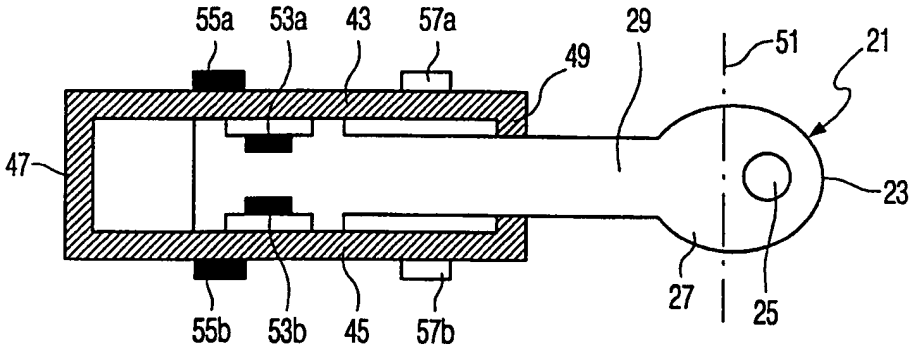


FIG. 7

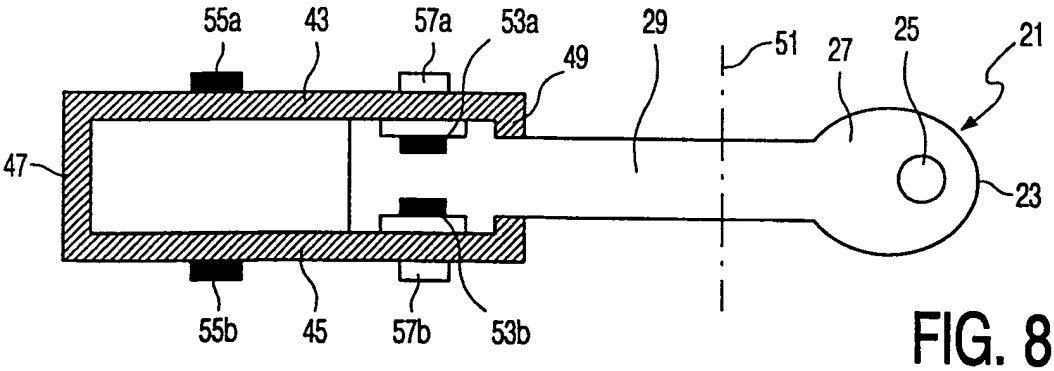
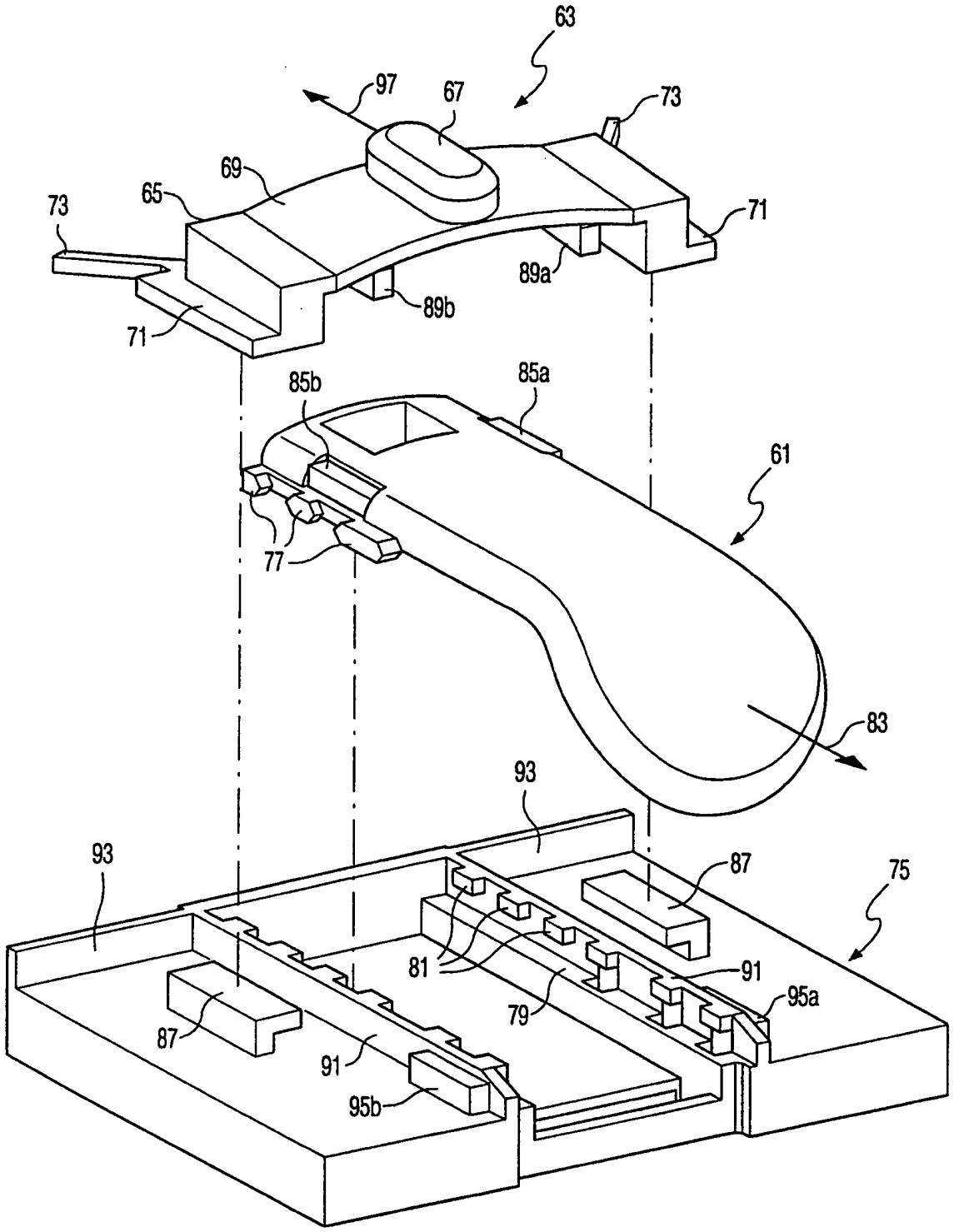


FIG. 8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89a
89b
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85b
85a
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95a
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87
91
95b

FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 99/00177

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 1/02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 4307164 A1 (CONSTIN DESIGN GMBH), 8 Sept 1994 (08.09.94), column 2, line 18 - line 21; column 4, line 14 - line 18, figure 9	1-4
Y		5
A		6-8
	--	
Y	US 5719935 A (JONG-NAM MA), 17 February 1998 (17.02.98), column 3, line 20 - line 58, figures 1-6, abstract	5
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 July 1999	22 -07- 1999
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Roland Landström/cs Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 99/00177

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	EP 0841793 A1 (PHILIPS ELECTRONICS N.V.), 13 May 1998 (13.05.98), column 1, line 40 - column 3, line 41, figures 1A-3B, abstract	1-4
P,A	--	5-8

INTERNATIONAL SEARCH REPORT

Information on patent family members

01/07/99

International application No.
PCT/IB 99/00177

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 4307164 A1	08/09/94	NONE	
US 5719935 A	17/02/98	JP 9036936 A	07/02/97
EP 0841793 A1	13/05/98	FR 2755812 A	15/05/98
		JP 10164200 A	19/06/98